

Supplementary Description

ABSODEX AX9000TS/TH-U3 (PROFIBUS-DP specification)

Introduction

Thank you for choosing our ABSODEX.

ABSODEX is a direct-drive index unit developed to drive intermittently operated turntables or the likes of general industrial assembling machines, inspection machines, etc. flexibly at a superior precision.

This document gives supplementary description of the specifications characteristic to ABSODEX AX9000TS/TH (PROFIBUS-DP specification).

For the operation method, precautions on operation, maintenance and inspection items and so on, refer to "Instruction Manual for AX Series TS/TH type" contained in the attached CD-ROM.

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REVISIONS

1. Specifications

1.1 Product Configuration

	Name		Quantity
1	Driver unit		1
2	Accessories	CN5 motor power connector: PC4/3-ST-7.62 (Phoenix Contact)	1
		CN4 power supply connector: PC4/5-ST-7.62 (Phoenix Contact)	1

1.2 General Specifications of Driver

Item		AX9000TS/TH-U3 (PROFIBUS-DP specification)
Power	Main	3-200V AC - 10% to 230V AC + 10% (standard) 1-100V AC - 10% to 115V AC + 10% (J1:option) (Note 1)
	Control	3-200V AC - 10% to 230V AC + 10% (standard) 1-100V AC - 10% to 115V AC + 10% (J1:option) (Note 1)
Frequency		50/60 Hz
Configuration		Open modular type (driver, and controller)
Operating Ambient Temperature Range		0 to 50℃
Operating Relative Humidity Range		20 to 90%RH (No condensation allowed)
Storage Ambient Temperature Range		-20 to 80℃
Storage Relative Humidity Range		20 to 90%RH (No condensation allowed)
Atmosphere		Free from corrosive gases, and dust
Anti-noise		1000V (P-P), pulse width 1μsec, startup 1nsec
Anti-vibration		4.9m/s ²
Mass		AX9000TS: About 1.6kg, AX9000TH: About 2.1kg

Note 1) If item is "AX9000TH-U3", "J1:option" can not be selected.

1.3 Performance Specifications of Driver

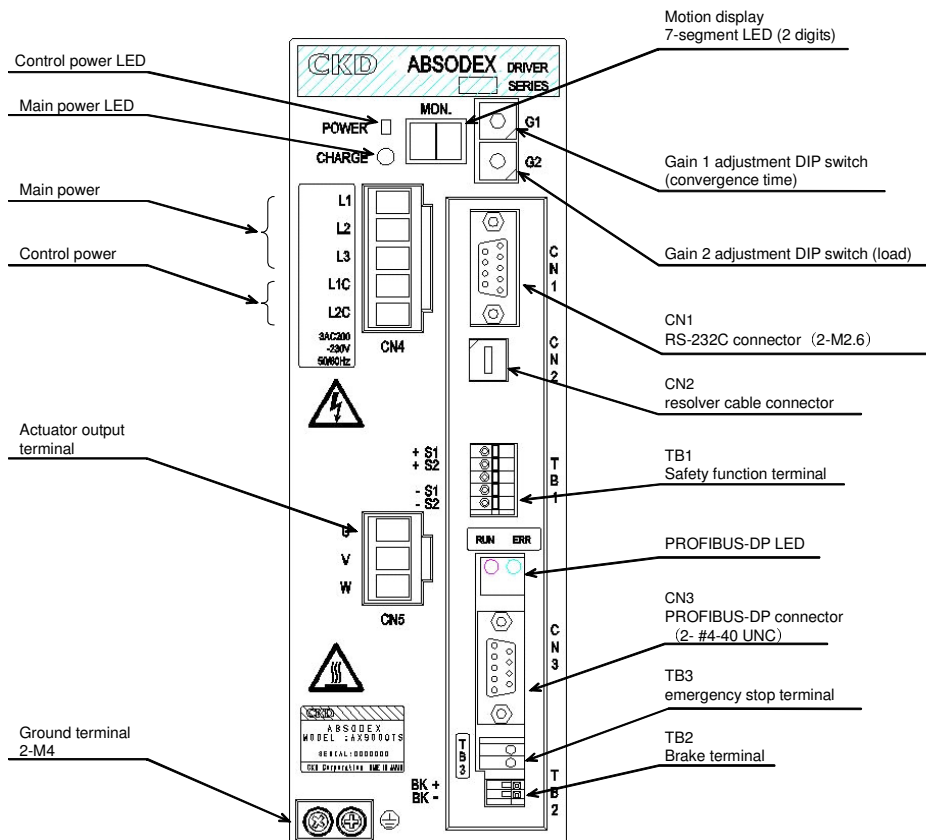
Item	Description
Number of Controlled Axis	1 axis, 540672 pulses/rotation
Angle Setting Unit	° (degree), pulse, and number of indexes
Angle Setting Minimum Unit	0.001°, 1 pulse
Speed Setting Unit	sec, rpm
Speed Setting Range	0.01 to 100sec/0.01 to 300rpm (Note 2)
Number of Indexes	1 to 255
Maximum Instruction Value	7 digit input ±9999999
Timer	0.01 to 99.99sec
Programming Language	NC language
Programming Method	Data setting through RS-232C port using Dialogue Terminal or PC
Operation Mode	Auto, single block, MDI, jog, servo OFF
Coordinate	Absolute and incremental
Acceleration Curve	<Five types> Modified sine (MS), Modified constant velocity (MC, MC2) Modified trapezoid (MT), Trapezoid (TR)
Status Display	LED power lamp display
Motion Display	7-segment LED (2 digits)
Communication Interface	Meets RS-232C specification
PROFIBUS-DP Communication Function	<Input> Home positioning instruction, reset, start, stop, continuous rotation stop, emergency stop, answer, position deviation counter clear, program number selection, brake release, servo ON, program number setting, ready return
	<Output> Alarm 1 and 2, positioning completion, in-position, standby for start input, M code 8 points, output during indexing 1/2, home position output, M code strobe, segment position strobe, servo status, ready output
Program Capacity	About 6000 characters (256 pcs.)
Electronic Thermal	Protects the actuator from being overheated.

Note 2) The speed setting range of the actuator varies with the actuator.

2. Wiring

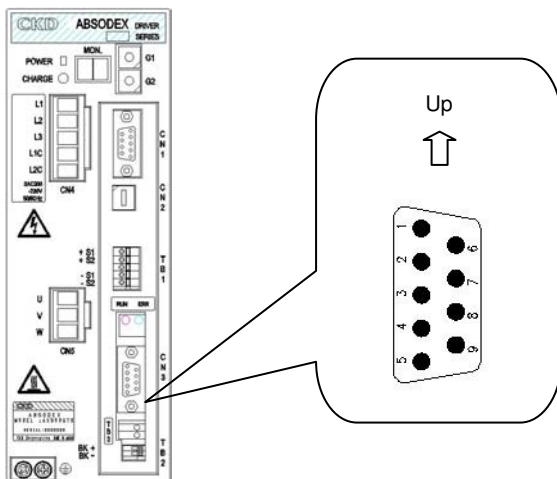
2.1 Panel Description

A terminal strip and connectors, etc. are located on the front panel of the driver.



2.2 Communication Connector

The pin layout of PROFIBUS-DP communication connector CN3 is shown below.



Pin layout of CN3 (D-sub 9pin)

Pin	Signal name	Function	Description
1		Not used	—
2		Not used	—
3	RxD/TxD-P	Send/receive data	Connect line B (red)
4		Not used	—
5	DGND	GND	GND for VP(bus terminal)
6	VP	+5V power	For bus terminal
7		Not used	—
8	RxD/TxD-N	Send/receive data	Connect line A (green)
9		Not used	—

We recommend the use of cables and connectors dedicated for PROFIBUS-DP. Also, a terminal resistor is required when placing this product on the terminal of a network. Please use a connector with a terminal resistor.

Connector (Example): SUBCON-PLUS-PROFIB/SC2 (Phoenix Contact)

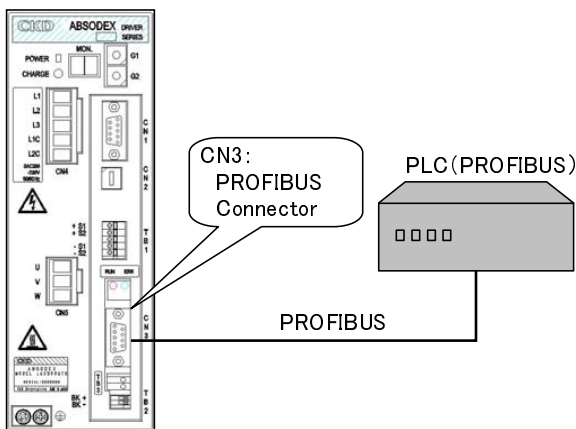
2.3 Connecting the communication cable

Connect the communication cable in the following way.

2.3.1 Connecting example to the PLC (CN3)

ABSODEX

AX900TS-U3



ABSODEX
AX900TS-U3

信号名	Pin No.
NC	1
NC	2
RxD/TxD-P	3
CNTR-P	4
DGND	5
VP(5V)	6
NC	7
RxD/TxD-N	8
NC	9

CN3:
PROFIBUS
Connector

D-SUB9

PLC (PROFIBUS)

Pin No.	信号名
1	NC
2	NC
3	RxD/TxD-P
4	CNTR-P
5	DGND
6	VP(5V)
7	NC
8	RxD/TxD-N
9	NC

PROFIBUS
Interface

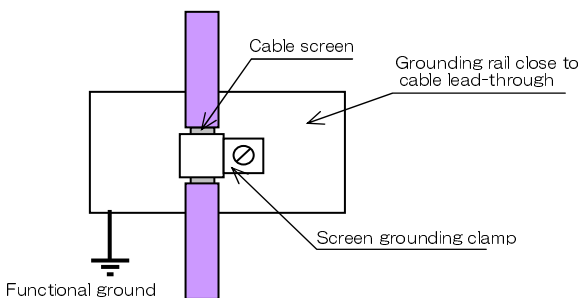
D-SUB9

- Ground both ends of the shielded cable to reduce the effects of noise.



CAUTION

- Do not bend the communication cable forcibly. Assure a sufficient bending radius.
- Reserve a sufficient distance between the communication cable and power cable (motor cable).
- If the communication cable is routed near the power cable or if they are tied, noise will enter to make communication unstable, possibly causing frequent communication errors and/or communication retries.
- The connector for RS-232C (CN1) and connector for PROFIBUS (CN3) are used differently. Pay extra attention when wiring since the driver could break down if wired improperly.



- Strip the PROFIBUS cable and ground the shield section using FG clamp and such to reduce grounding resistance.



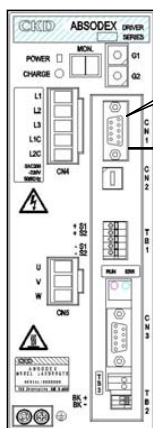
CAUTION

- Be sure to use special signal cables complying with the PROFIBUS specifications.
- For those provided with a connector fixing screw, securely tighten the connector fixing screw when inserting the connector. Otherwise the connector may be dislocated and cause malfunction. For those not provided with a connector fixing screw, check that the catch of the connector snaps in position.
- Loosen the two fixing screws before removing the connector. The connector may be damaged if excess force is applied to the connector without the two screws loosened.
- Remove the connector vertically to avoid excess force from being applied to the connector.

For details of the laying of the communication cable, refer to the PROFIBUS Laying Manual, etc.

2.3.2 Connecting example to the PC (CN1)

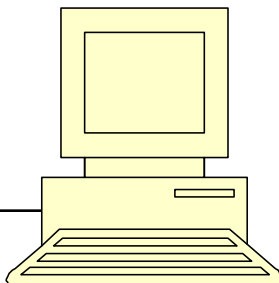
ABSODEX
AX9000TS-U3



CN1:
RS-232C
Connector

RS-232C

PC



ABSODEX
AX9000TS-U3

信号名	Pin No.
TxD	1
RxD	2
NC	3
NC	4
FG	5
NC	6
/EMER	7
GND	8
+5V(out)	9

CN1:
RS-232C
Connector

D-SUB9

PC (DOS/V)

Pin No.	信号名
1	DCD
2	RD
3	TD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

RS-232C
Interface

D-SUB9



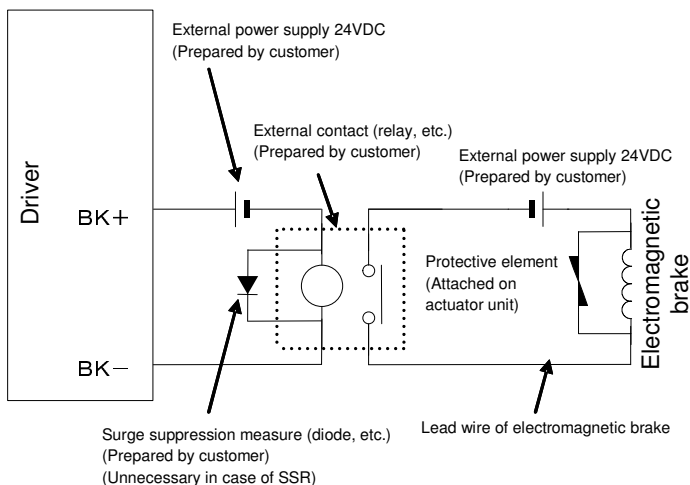
CAUTION

- The connector for RS-232C (CN1) and connector for PROFIBUS (CN3) are used differently. Pay extra attention when wiring since the driver could break down if wired improperly.

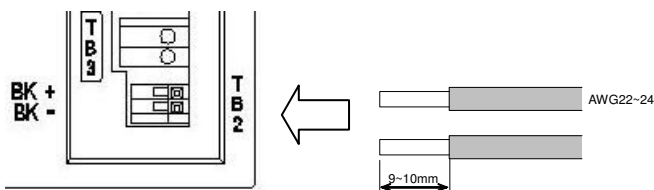
2.4 IO interface

Connect "brake output (TB2)" and "emergency stop input (TB3)" in the following way.

2.4.1 Wiring of brake output (TB2)

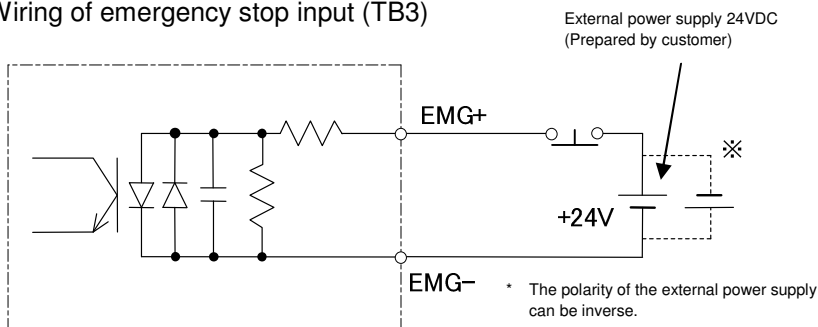


- The BK+ and BK- terminals indicate brake output terminals (rated current: Max. 150mA). To use the electromagnetic brake, a 24VDC external power supply is necessary.
- To connect above-mentioned induction loads such as the relay to the external contact, use ones with a rated coil voltage of 24VDC and a rated current within 100mA, and take a surge suppression measure.
- Perform wiring of the electromagnetic brake so that the brake is released when the current flows across BK+ and BK-, and it is applied when the current is stopped, without relations to the negative or positive activation.



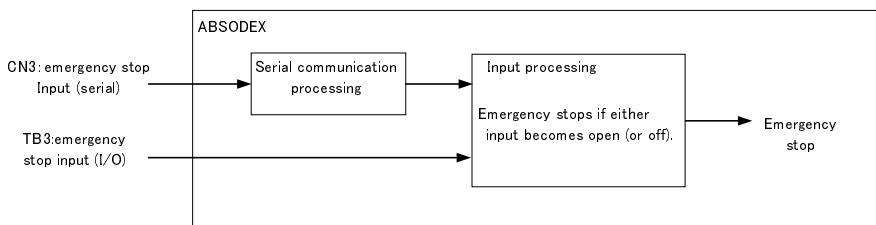
- The cable sheath peeling length should be 9 or 10mm.
- The applicable cable is AWG22 to 24 (single cable) or AWG22 to 24 (stranded cable).

2.4.2 Wiring of emergency stop input (TB3)

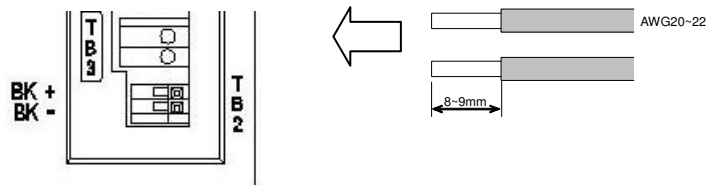


Rated voltage 24V $\pm 10\%$, rated current within 5mA

- The emergency stop input will be effective as default setting. Refer to the "AX Series TS, TH Type manual" for setting instructions.
- Emergency stop is a "b" contact input. Thus it will take effect when emergency stop input (TB3) becomes open. (Emergency stop using PROFIBUS will be effective when the input data is OFF)



- Emergency stop can be inputted by TB3's input terminal or CN3's PROFIBUS communications and if one of the inputs becomes open (or off), it will be recognized as emergency stop.
→ Input to TB3 is necessary to release the emergency stop.



- The cable sheath peeling length should be 8 or 9mm.
- The applicable cable is AWG20 to 24 (single cable) or AWG20 to 22 (stranded cable).



CAUTION

- The driver will be damaged if the BK+ and BK- terminals of the driver are connected directly with the electromagnetic brake.
- If the polarity of the BK+ and BK- terminals of the driver is wrong, the driver may be broken.
Be careful when wiring the external power supply.
- The operating instructions for brake output (TB2) and emergency stop input (TB3) are different. Pay extra attention when wiring since the driver could break down if wired improperly.
- Do not press the button forcibly when inserting or disconnecting cables into/from the terminal block.

3. PROFIBUS-DP Communication Function

3.1 Communication Specifications

Item	Specification
Communication Protocol	PROFIBUS DP-V0 conformed
I/O data	Input 8 byte/ output 8 byte
Communication speed	12M/6 M/3 M/1.5 M/500k/187.5 k/93.75 k/45.45 k /19.2 k/9.6kbps (Auto-Baud Rate function)
Connection cable	Cable compatible with PROFIBUS (Shielded twisted pair cable)
Node address	0 to 125 (Configured with parameter)
Number of connected modules	Without repeater: Max. 32 stations for each segment. With repeater: Total of Max. 126 stations.

- PROFIBUS network must have all the stations joining the network registered before operating. Refer to the master unit, configuration tool manual to find out how to register.
- There are GSD files with the data for each station that allows PROFIBUS to be configured easily. GSD file is defined for the communication function of a device, allowing you to configure a PROFIBUS network with stations manufactured by various manufacturers.
- GSD files for PROFIBUS devices that conform to PROFIBUS standards can be downloaded from "PROFIBUS International" free of charge.

3.2 Remote I/O

3.2.1 Basic format

The table below shows the basic format of Input data sent from the host component (such as PLC) to a PROFIBUS unit (Absodex) and Output data sent from an Absodex to a host component. Input data, Output data are both 8 byte data.

With 3 bytes occupation, bytes 0 to 2 will be used and others will not be available.

· Input data

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
1	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0
2	2.7	2.6						
3								
4	Monitor code							
5								
6	Command code							
7								

· Output data

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0
1	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0
2	2.7	2.6					2.1	2.0
3	Response code							
4	Monitor data							
5								
6	Loaded data							
7								

3.2.2 Input / output data

PLC → AX(input)

Byte No.	Signal name	Logic	Judgment
0.0	Program number selection input (bit 0)	Positive	Level
0.1	Program number selection input (bit 1)	Positive	Level
0.2	Program number selection input (bit 2)	Positive	Level
0.3	Program number selection input (bit 3)	Positive	Level
0.4	Program number selection input (bit 4) / Program number setting input, second digit	Positive	Level / Edge
0.5	Program number setting input, first digit / Program number selection input (bit 5)	Positive	Level / Edge
0.6	Reset input	Positive	Edge
0.7	Home return command input	Positive	Edge
1.0	Start input	Positive	Edge
1.1	Servo-on input / Program stop input	Positive	Level / Edge
1.2	Ready return input / Continuous rotation stop input	Positive	Edge
1.3	Answer input / Position deviation counter reset	Positive	Edge
1.4	Emergency stop input	Negative	Level
1.5	Brake release input	Positive	Level
1.6	Reserved		
1.7	Reserved		
2.0 to 2.5	Reserved		
2.6	Monitor output execution request	Positive	Level
2.7	Command code execution request	Positive	Edge

AX → PLC(output)

Byte No.	Signal name	Logic
0.0	M code output (bit 0)	Positive
0.1	M code output (bit 1)	Positive
0.2	M code output (bit 2)	Positive
0.3	M code output (bit 3)	Positive
0.4	M code output (bit 4)	Positive
0.5	M code output (bit 5)	Positive
0.6	M code output (bit 6)	Positive
0.7	M code output (bit 7)	Positive
1.0	In-position output	Positive
1.1	Positioning completion output	Positive
1.2	Start input wait output	Positive
1.3	Alarm output 1	Negative
1.4	Alarm output 2	Negative
1.5	Indexing-in-progress output 1 / Home position output	Positive
1.6	Indexing-in-progress output 2 / Servo state output	Positive
1.7	Ready state output	Positive
2.0	Segment position strobe output	Positive
2.1	M code strobe output	Positive
2.2 to 2.5	Reserved	
2.6	Monitoring	Positive
2.7	Command code execution complete	Positive

PLC → AX(input)

Byte No.	Signal name
3	
4	Monitor
5	
6	Command code
7	

AX → PLC(output)

Byte No.	Signal name
3	Response code
4	Monitor data lower 8 bits
5	Monitor data upper 8 bits
6	Loaded data lower 8bits
7	Loaded data upper 8 bits

Monitor code (input: byte 4)

Code No.	Monitored item	Data length	Unit	Range
00h				
01h	Current position in full rotation (deg.)	16bit	×10 [deg.]	0 to 3599
03h	Current position in full rotation (pulse)	16bit	1/32[pulse]	0 to 16895
05h	Position deviation amount	16bit	[pulse]	-32768 to 32767
07h	Program number	16bit	[No.]	0 to 999
08h	Electronic thermal relay	16bit	×100 [°C]	0 to 65535
09h	Rotation speed	16bit	[rpm]	-32768 to 32767
0Ah				
0Bh				

Command code (output : byte 6)

Load command code

Code No.	Item and function	Description of loaded data (byte 6,7)
00h		
10h	Current alarm loading	Current alarm number

Load current alarm (10h)

The current alarm number is loaded.

The response is set as loaded data (output : byte6,7).

Each alarm byte indicates the type, and up to two alarms are specified.

Alarm indication is consistent to the 7-segment indication.

(The first digit indicates details of the alarm and the second digit indicates the alarm number.)

Alarms not indicated in 0 to F

Alarm H → "d"

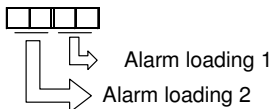
Alarm L → "b"

Alarm P, U and others → "8"

Alarms are displayed in the order from "F" to "0."

In case of "no alarm," "00" is set.

output :
byte 6,7

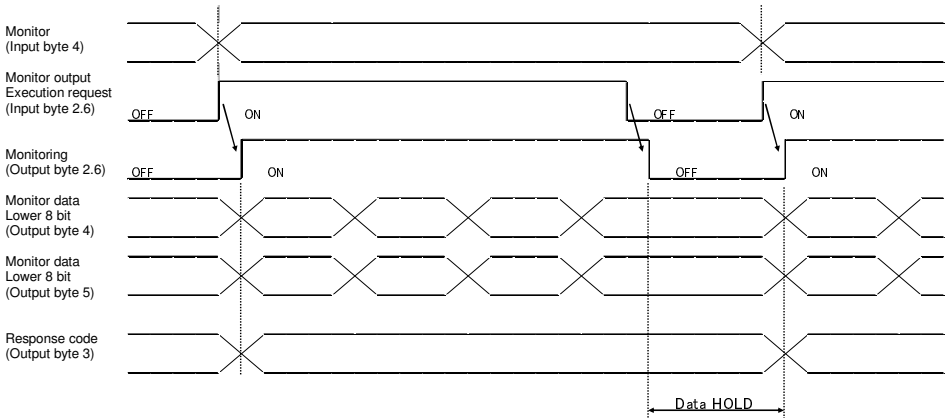


Response code (output : byte 3)

Code No.	Description of error	Details
0	Normal reply	The command is executed normally.
1	Code error	
2	Parameter selection error	A prohibited parameter number is specified.
3	Error in writing range	An excessive value is written.

3.3 Data Communication Timing Chart

3.3.1 Monitor code



Entering monitor (Input byte 4) and monitor output execution request (Input byte 2.6) as monitor codes will set the following data. All 16-bit data pieces will be divided into the upper 8 bits and lower 8 bits and stored in the memory. All data is in hexadecimal. At the time, the monitoring signal (output byte 2.6) is turned on simultaneously.

Monitor data, lower 8 bits (output byte 4):

Lower 8 bits of data requested with monitor (input byte 4)

Monitor data, upper 8 bits (output byte 5):

Upper 8 bits of data requested with monitor (input byte 4)

If there is no data at "output byte 5", the sign is acquired. The sign is "00" in case of "+" while it is "FF" in case of "-."

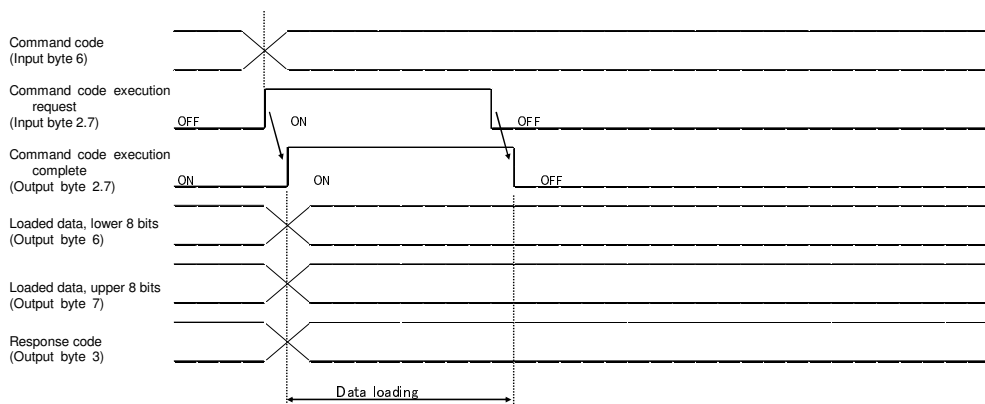
The monitor data acquired in remote registers are always updated while the monitoring signal (output byte 2.6) remains turned on.

If the monitoring signal (output byte 2.6) is turned off, monitor data (output byte 4 and 5) will be held.

If a monitor code not included in specifications is set on monitor (input byte 4), an error code (□1) will be set in the response code.

3.3.2 Command code

(1) Load command code (00h to 10h)



Enter the load command code as command code (input byte 6) and turn the command code execution request (input byte 2.7) on to acquire the data corresponding to the specified loading code in load data (output byte 6,7). All 16-bit data pieces are divided into the upper 8 bits and lower 8 bits when they are stored in remote registers.

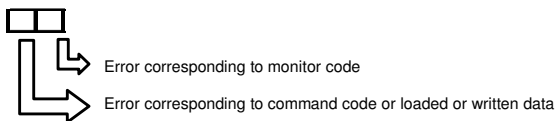
All data is in hexadecimal. At the time, command code execution completion (output byte 2.7) is turned on simultaneously. Load data from (output byte 6,7) while the command code execution request (input byte 2.7) remains turned on. The data is held until the next load command code is entered and the command code execution request (input byte 2.7) is turned on.

If a command code not included in specifications is set as a command code (input byte 6), an error code (1□) is set in the response code. If a parameter that cannot be used is loaded, an error (2□) is set.

Turn the command code execution request (input byte 2.7) off after data loading is finished.

3.3.3 Response code

If the monitor code or command code specified in the remote register is out of the allowable setting range, an error code will be set on the response code (output byte 3). If they are normal, "00" will be set.



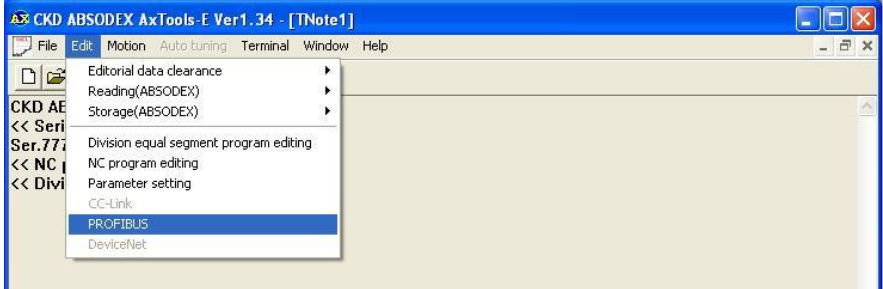
Code No.	Description of error	Details
0	Normal reply	Command execution is finished normally.
1	Code error	
2	Parameter selection error	A parameter number that cannot be referred to is specified.
3	Writing range error	A value out of the allowable setting range is written.

3.4 Defining the PROFIBUS-DP Register

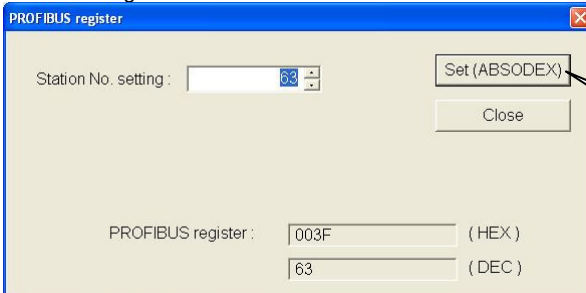
Follow the procedure below to use the PC software to enter the station number and baud rate. (The default station number is "99".)

a. PROFIBUS setting screen

Select "Edit" - "PROFIBUS" from the menu of the Teaching Note to open the "PROFIBUS register" screen.



b. PROFIBUS register



After entering the station number and baud rate, click on this button.

i. Station No. setting

The current station number setting is displayed.
Enter the new station number in the range from 0 to 125.

ii. Baud rate setting

Configured using auto baud rate function. Compatible with 9.6 k, 19.2 k, 45.45 k, 93.75 k, 187.5k, 500k, 1.5M, 3M, 6M and 12Mbps.

iii. PROFIBUS register

The specified values of the station number and baud rate registers are displayed.

iv. Set (ABSODEX)

Click on this button to transfer new data to the register of ABSODEX.

v. Close

Click on this button to close the screen.

2026/6/30 Discontinued

c. End of setting

After the settings are normally entered, a completion screen is displayed.



- Shutdown and restart the power after finishing configuration.
Settings for station No. will take effect after the power has been restarted.

d. Error in setting

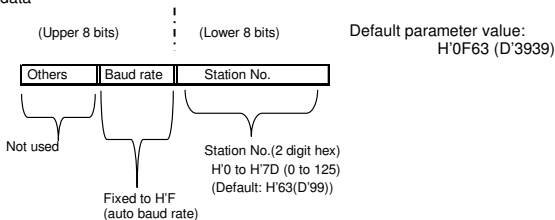
The following screen is displayed if there is an error in the station number setting.



* If the system is initialized, PROFIBUS register settings will return to default settings. Set the PROFIBUS register setting again after initializing the system.

* To enter settings at the Dialogue Terminal, send the following communication code in the terminal mode.

Word data



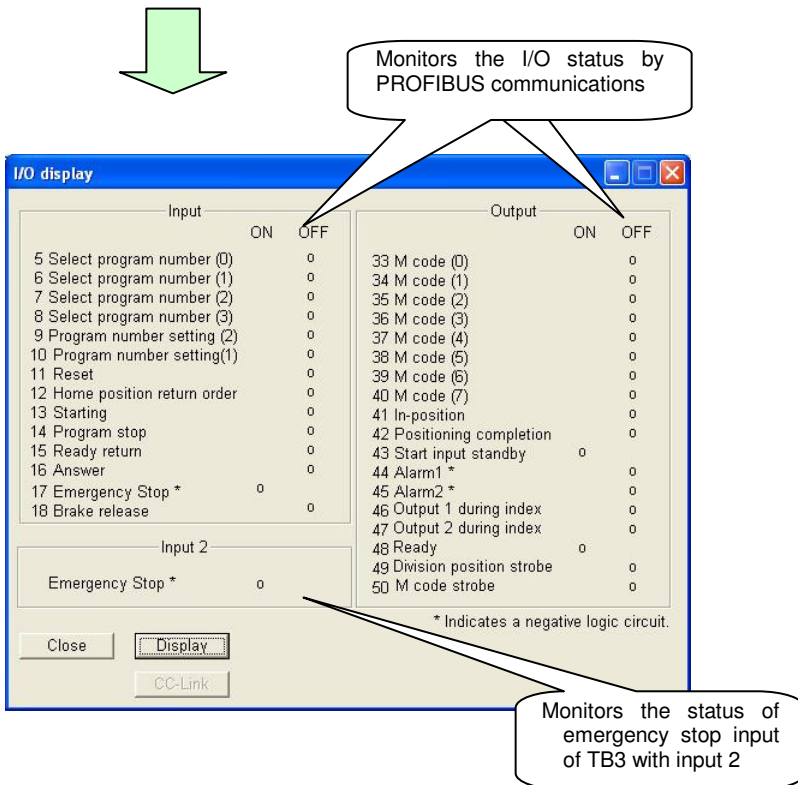
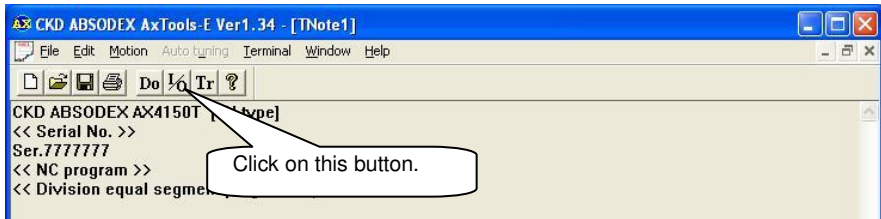
Example: "Station number 25"

The setting is "0F19H" according to hexadecimal notation and it is "3865D" according to decimal notation. In the terminal mode, send "L7_61_3865" to enter the station number and baud rate.

3.5 Monitoring the PROFIBUS Communication State

- I/O view

Click on the "I/O" button in the menu of the Teaching Note to open the "I/O View" screen.

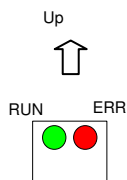


→ The I/O state can be monitored.

“*” shows negative logic, thus, the I/O indication will indicate ON when it is open.

3.6 LED Indication

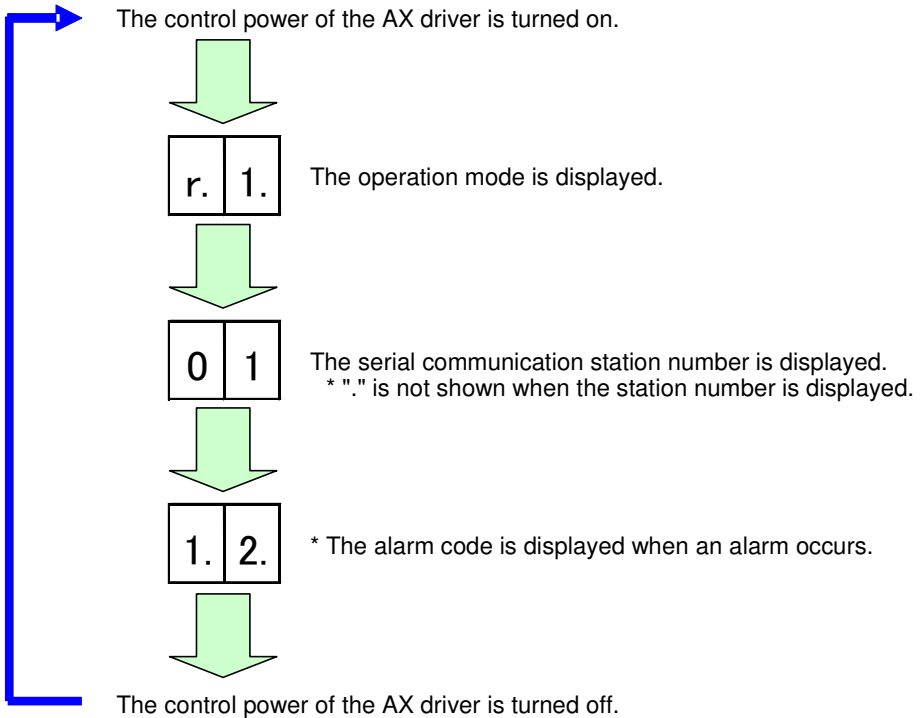
The state of the module and that of the network can be displayed. See the description in the following table for the LED indication.



LED	Color	Description of indication
RUN	Green	Lit when the slave station is receiving normal data from the master station.
		Unlit upon time-over.
ERR	Red	Unlit during normal communication. (RUN is lit.)
		Lit upon a transmission error (CRC error). Blinks when there is an error in the station number setting or transmission speed setting.
		Blinks upon time-over.

3.7 7-segment LED Indication

• Indication given at power-on



REVISIONS

Print Data	Ver.	Revision
Apr. 2010	—	First edition
Jun. 2010	Ver. 2	2.4 The description in TB2 and TB3 are changed.